Section 3300

Paving for Driveways and Parking Areas

PART 1: General

1.1 *General Description of Work* –

1.1.1 *Graded Aggregate Base* - Extent of base course work is shown on drawings

1.1.2 *Asphalt Concrete Paving* - Extent of Asphalt concrete paving work is shown on drawings

1.1.3 *Cast-In-Place Concrete* - Mixing, placing, finishing, and providing all related services necessary to construct all cast-in-place concrete work indicated on plans.

1.2 *Submittals* –

1.2.1 *Material Certificates* – Provide copies of material certificates signed by material producer and Contractor, certifying that each material item complies with, or exceeds specified requirements.

1.2.2 *Design Mix* - Provide design mix for each type of asphalt concrete paving course for approval by the Project Engineer.

1.2.3 *Manufacturer's Data* - Submit manufacturer's product data with installation instructions for proprietary materials including reinforcement and forming accessories, admixtures, joint materials, hardeners, curing materials and others as requested by Engineer.

1.2.4 *Laboratory Reports* - Submit 2 copies of laboratory test or evaluation reports for concrete materials and mix designs as requested by Engineer.

1.3 *Quality Assurance* –

1.3.1 Comply with FDOT Standard Specifications, latest edition, and with local governing regulations.

1.3.2 Comply with the latest published edition of the American Concrete Institute (ACI) and American Society of Testing and Materials (ASTM) standards and codes

1.3.3 Cast-In-Place Concrete –

1.3.3.1 *Mix Proportions and Design* – Proportion mixes complying with mix design procedures specified in ACI 301, Specifications for Structural Concrete for Buildings.

1.3.3.1.1 Submit written report to Engineer for each proposed concrete mix at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed and are acceptable to Engineer.

1.3.3.1.2 Mix designs may be adjusted when material characteristics, job conditions, weather, test results, or other circumstances warrant. Do not use revised concrete mixes until submitted to and accepted by Engineer.

1.3.3.1.3 Use air-entering admixture in all concrete, providing not less than 4 percent or more than 6 percent entrained air for concrete exposed to freezing and thawing, and from 2 percent to 4 percent for other concrete.

1.3.3.2 *Concrete Testing Service* - Employ acceptable ACI certified independent testing laboratory to perform materials evaluation, testing, and design of concrete mixes. (When required by Owner).

1.3.3.2.1 *Sampling* - Sampling procedures and frequency shall meet the requirements of ASTM C 172, Standard Practice for Sampling Freshly Mixed Concrete.

1.3.3.2.2 *Slump* - Slump characteristics shall be tested as specified in ASTM C 143, Standard Test Method for Slump of Hydraulic-Cement Concrete. One test shall be completed for each load at point of discharge.

1.3.3.2.3 *Air Content* - Air content testing shall meet the requirements of ASTM C 173, Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method. One test shall be completed for each set of compressive strength specimens.

1.3.3.2.4 *Compressive Strength* - Concrete compressive strength tests shall meet the requirements of ASTM C 39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens. One set of samples shall be collected for each 50 cu. yds. or fraction thereof of each class of concrete; one specimen tested at 7 days, one specimen tested at 28 days, and one retained for later testing if required.

1.3.3.2.5 When the total quantity of a given class of concrete is less than 50 cu. yds., strength tests may be waived by Engineer if field experience indicates evidence of satisfactory strength.

1.3.3.2.6 Test results will be reported in writing to Engineer, Contractor, and concrete producer within hours after tests are made.

1.4 *Site Conditions* –

1.4.1 *Weather Limitations* –

1.4.1.1 *Graded Aggregate Base* - Graded aggregate base course may be placed when air temperature is above 30F (-1C) and rising.

1.4.1.2 *Asphalt Concrete* - Apply prime and tack coats when ambient temperature is above 50 °F (10 °C), and when temperature has not been below 35 °F (1 °C) for 12 hours immediately prior to application. Do not apply when base is wet or contains an excess of moisture.

1.4.1.3 Construct asphalt concrete surface course when atmospheric temperature is above 40 °F (4 °C), and when base is dry. Base course may be placed when air temperature is above 30 °F (-1 °C) and rising.

1.4.2 Establish and maintain required lines and elevations.

PART 2: Products

2.1 *General* - Use locally available materials and gradations which exhibit a satisfactory record of previous installations.

2.2 *Graded Aggregate Base Course* - Materials for the graded aggregate base shall meet the requirements of the FDOT Standard Specifications for Road and Bridge Construction, latest edition.

2.3 *Asphalt Concrete* –

2.3.1 *Prime Coat* - Cut-back asphalt type; AASHTO M 82 (ASTM D 2027) MC-30, MC-70 or MC-250.

2.3.2 *Tack Coat* - Emulsified asphalt; AASHTO M 140 (ASTM D 977) or M 208 (D 2397); SS-1, SS-1h, CSS-1 or CSS-1h, diluted with one part water to one part emulsified asphalt.

2.3.3 *Lane Marking Paint* - Paint shall meet or exceed Federal Specification TT-P-19528 and conform to the reflective requirements of FDOT Specifications.

2.4 *Cast-In-Place Concrete* –

2.4.1 *Concrete Materials* –

2.4.1.1 *Portland Cement* - Portland cement shall meet the requirements of ASTM C 150, Standard Specification for Portland Cement, type as required.

2.4.1.2 *Fly Ash* - Fly ash shall meet the requirements of ASTM C 618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete, Type C or F. Limit use of fly ash in concrete mix design to not exceed 25 percent of cement content by weight.

2.4.1.3 *Aggregates* – Aggregate shall meet the requirements of ASTM C 33; Standard Specification for Concrete Aggregates except local aggregates of proven durability may be used when acceptable to Engineer.

2.4.2 *Water* - Water for concrete shall be potable.

2.4.3 *Admixtures* -

2.4.3.1 *Air-Entraining Admixture* - Air entraining admixture shall meet the requirements of ASTM C 260, Standard Specification for Air-Entraining Admixtures for Concrete.

2.4.3.2 *Water-Reducing Admixture* - Water reducing admixture shall meet the requirements of ASTM C 494, Standard Specification for Chemical Admixtures for

Concrete, as required to suit project conditions. Only use admixtures, which have been tested and accepted in mix designs, unless otherwise approved by the Engineer. Superplasticizers are not permitted without prior approval of Engineer.

2.4.4 *Related Materials* -

2.4.4.1 *Waterstops* - Flat dumbbell or centerbulb type, size to suit joints, of either rubber (COE CRD C 513, Corps of Engineers Specifications for Rubber Waterstops) or PVC (COE CRD C 572, Corps of Engineers Specifications for Polyvinylchloride Waterstops)

2.4.4.2 *Moisture Barrier* - Clear 8-mils thick polyethylene; polyethylene-coated barrier paper; or 1/8" thick asphalt core membrane sheet.

2.4.4.3 *Membrane-Forming Curing Compound* - Membrane forming curing compounds shall meet the requirements of ASTM C 309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete, Type I.

2.4.4.4 *Joint Fillers* -

2.4.4.4.1 *Joint Sealer* - Hot poured, non-extruding, elastic joint sealer shall meet the requirements of ASTM D 6690, Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.

2.4.4.4.2 *Performed Expansion Joint Filler* - Preformed expansion joint filler shall be Non-extruding, bituminous fiber meeting the requirements of ASTM D 1751, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction.

2.4.4.5 *Stability* - Provide form materials with sufficient stability to withstand pressure of placed concrete without bow or deflection.

2.4.4.6 *Exposed Concrete Surfaces* - Material to suit project conditions.

2.4.5 *Reinforcing Materials* -

2.4.5.1 *Deformed Reinforcing Bars* - Reinforcing bars shall meet the requirements of ASTM A 615, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement, Grade 60, unless otherwise indicated.

2.4.5.2 *Welded Wire Fabric* - Welded wire fabric shall meet all requirements of ASTM A 185, Standard Specification for Steel Welded Wire Reinforcement.

PART 3: Execution

3.1 *Graded Aggregate Base* –

3.1.1 *Subgrade Preparation* –

3.1.1.1 It is the Contractor's responsibility that the finished roadbed section meets the bearing value requirements, regardless of the quantity of stabilizing materials

necessary to be added. After the roadbed grading operations have been substantially completed, the Contractor shall make his own determination as to the quantity (if any) of stabilizing material, of the type selected by him, necessary for compliance with the bearing value requirements.

3.1.1.2 Remove loose material from compacted sub-base surface immediately before applying herbicide treatment.

3.1.1.3 Proof roll prepared base surface to check for unstable areas and areas requiring additional compaction.

3.1.1.4 Notify Architect of unsatisfactory conditions. Do not begin base work until deficient subgrade areas have been corrected and are ready to receive base.

3.1.2 *Placing Base* - Place base course as directed in Section 204 of FOOT Standard Specifications. Place inaccessible and small areas by hand. Place each course to required grade, cross-section, and compacted thickness, as indicated on plans.

3.1.3 *Field Quality Control* -

3.1.3.1 *General* - Test in-place base courses for compliance with requirements for thickness and surface smoothness. Repair or remove and replace unacceptable paving as directed by Architect.

3.1.3.2 *Thickness* - In-place compacted thickness will not be acceptable if exceeding following allowable variation from required thickness:

3.1.3.3 *Base Course* - 1/2", plus or minus.

3.1.3.4 *Surface Smoothness* - The finished surface of the base course shall be checked with a template cut to the required crown and with a 15-foot straightedge laid parallel to the centerline of the road. All irregularities greater than 1/4" shall be corrected by scarifying, and removing or adding base material as may be required, after which the entire area shall be re- compacted to meet the specified density requirements.

3.1.3.5 *Compaction* - Graded aggregate base shall be compacted to a minimum density of 98% of maximum density as determined by the Modified Proctor Compaction Test. Soil-cement base (if any) shall be compacted to a minimum density of 95% of the Modified Proctor Test. The graded aggregate base shall be compacted at a moisture content within 1% of the optimum moisture content determined for the base material, by the modified Proctor compaction test; moisture contents for the base materials should be maintained, in the noted range, until completion of the pavement operations. All test results are to be submitted to the Engineer prior to beginning paving operations.

3.1.3.6 *Frequency of Field Density Test* - One test per 400 square yards of paved area.

3.2 *Asphalt Concrete –*

3.2.1 *Surface Preparation* -

3.2.1.1 Remove loose material from compacted base surface immediately before applying prime coat.

3.2.1.2 Proof roll prepared base surface to check for unstable areas and areas requiring additional compaction.

3.2.1.3 Notify Architect/Engineer of unsatisfactory conditions. Do not begin paving work until deficient base areas have been corrected and are ready to receive paving.

3.2.1.4 *Prime Coat* - Apply at rate of 0.15 to 0.20 gal. per sq. yd., over compacted base. Apply material to penetrate and seal, but not flood, surface. Cure and dry as long as necessary to attain penetration and evaporation of volatile.

3.2.1.5 *Tack Coat* -

3.2.1.5.1 Apply to contact surfaces of previously constructed asphalt or portland cement concrete and surfaces abutting or projecting into asphalt concrete pavement. Distribute at rate of 0.05 to 0.15 gal. per sq. yd. of surface.

3.2.1.5.2 Allow to dry until at proper condition to receive paving.

3.2.1.5.3 Exercise care in applying bituminous materials to avoid smearing of adjoining concrete surfaces. Remove and clean damaged surfaces.

3.2.2 *Plant Mix Asphaltic Surface Course* -

3.2.2.1 *General* - This item shall consist of a wearing surface constructed of asphaltic concrete on a prepared base, in accordance with the plans and specifications.

3.2.2.2 *Materials* -

3.2.2.3 The materials and construction methods shall comply with those set forth for Super Pave Asphaltic Concrete in the latest edition of the FOOT Standard Specifications, Section 320, 330 and 334.

3.2.2.4 The asphaltic cement shall met the requirements of AASHTO Specification M-20, Viscosity Grade AC-20 (Penetration Grade 60-70).

3.2.2.5 *Job Mix Formula* -

3.2.2.5.1 The Marshall Method of testing will be used in establishing the job mix formula and for control testing throughout the work. The following parameters shall be used in determining the job mix formula:

Number of blows each end of specimen	75
Stability	1200
Flow (maximum) 1/100 of an inch	14
Flow (minimum) 1/100 of an inch	8
Percent Voids	3 to 5
Percent Voids filled with bitumen	75 to 85

3.2.2.5.2 The density of field samples shall not be less than 95% of the Marshall laboratory compacted mixture composed of the same materials in like proportions.

3.2.2.6 *Thickness* - The thickness of the surface shall be as shown on the construction plans. This requirement shall be checked by cores and where a deficiency of more than 1/4"exists, the Contractor shall be required to correct the deficiency either by replacing the full thickness or overlaying the area to the satisfaction of the Architect/Engineer.

3.2.3 *Placing Mix* -

3.2.3.1 *General* - Place asphalt concrete mixture on prepared surface, spread and strike-off. Spread mixture at minimum temperature of 225 °F (107 °C). Place inaccessible and small areas by hand. Place each course to required grade, cross-section, and compacted thickness.

3.2.3.2 *Joints* - Make joints between old and new pavements, or between successive days' work, to ensure continuous bond between adjoining work. Construct joints to have same texture, density and smoothness as other sections of asphalt concrete course. Clean contact surfaces and apply tack coat.

3.2.4 *Rolling* -

3.2.4.1 *General* -

3.2.4.1.1 Begin rolling when mixture will bear roller weight without excessive displacement.

3.2.4.1.2 Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.

3.2.4.2 *Breakdown Rolling* - Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling, and repair displaced areas by loosening and filling, if required, with hot material.

3.2.4.3 *Second Rolling* - Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been thoroughly compacted.

3.2.4.4 *Finish Rolling* - Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained maximum density.

3.2.4.5 *Patching* - Remove and replace paving areas mixed with foreign materials and defective areas. Cut-out such areas and fill with fresh, hot asphalt concrete. Compact by rolling to maximum surface density and smoothness.

3.2.4.6 *Protection* -

3.2.4.6.1 After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

3.2.4.6.2 Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.2.5 *Traffic And Lane Markings* -

3.2.5.1 *Cleaning* - Sweep and clean surface to eliminate loose material and dust.

3.2.5.2 *Striping* -

3.2.5.2.1 Paint shall meet or exceed Federal Specification ll-P-1952B and conform to the reflective requirements of FDOT Specifications. Color: White, Yellow, and Blue (Whichever is required)

3.2.5.2.2 Apply paint with mechanical equipment to produce uniform straight edges. Apply in 2 coats at manufacturer's recommended rates.

3.2.6 *Field Quality Control* -

3.2.6.1 *General* -

3.2.6.1.1 Test in-place asphalt concrete courses for compliance with requirements for thickness and surface smoothness. Repair or remove and replace unacceptable paving as directed by Architect/Engineer. Contractor to replace asphalt removed for testing purposes.

3.2.6.1.2 Should any work or materials fail to meet the requirements set forth in the plans and specifications, Contractor shall pay for retesting of same.

3.2.6.1.3 A minimum of two cores and density test shall be made to determine pavement thickness and density. Density test and determinations shall be per FOOT Standard Specifications Section 330-10. Architect/Engineer shall determine location of cores and test.

3.2.6.2 *Thickness* -

3.2.6.2.1 In-place compacted thickness will not be acceptable if exceeding following allowable variation from required thickness:

3.2.6.2.1.1 *Base Course* - 1/2", plus or minus.

3.2.6.2.1.2 *Surface Course* - 1/4", plus or minus.

3.2.6.3 *Surface Smoothness* -

3.2.6.3.1 Test finished surface of each asphalt concrete course for smoothness, using 10' straightedge applied parallel with, and at right angles to centerline of paved area.

Surfaces will not be acceptable if exceeding the following tolerances for smoothness.

3.2.6.3.1.1 *Base Course Surface* - 1/4"

3.2.6.3.1.2 *Wearing Course Surface* – 3/16"

3.2.6.3.1.3 *Crowned Surfaces* - Test with crowned template centered and at right angle to crown. Maximum allowable variance from template, 1/4"

3.2.6.3.2 Check surface areas at intervals as directed by Architect/Engineer.

3.3 *Cast-In-Place Concrete* –

3.3.1 *Verification* - Verify anchors, seats, plates, reinforcements and other items to be cast into concrete are accurately placed, held securely, and will not cause hardship in placing concrete.

3.3.2 *Preparation* - Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Bonding agent shall be approved by the Engineer prior to use. Apply Bonding agent in accordance with manufacturer's instructions.

3.3.3 *Forming and Placing Concrete* -

3.3.3.1 *Job-Site Mixing* - Use drum type batch machine mixer, mixing not less than 1 minute for one cu. yd. or smaller capacity. Increase mixing time at least 15 seconds for each additional cu. yd. or fraction thereof.

3.3.3.2 *Ready-Mix Concrete* - Ready-Mix concrete shall meet all requirements of ASTM C 94, Standard Specification for Ready Mix Concrete.

3.3.3.3 *Formwork* - Construct so that concrete members and structures are of correct size, shape, alignment, elevation, and position.

3.3.3.3.1 Provide openings in formwork to accommodate work of other trades. Accurately place and securely support items built into forms.

3.3.3.3.2 Clean and adjust forms prior to concrete placement. Apply form release agents or wet forms, as required. Retighten forms during concrete placement if required to eliminate mortar leaks.

3.3.3.4 *Reinforcement* - Position, support, and secure reinforcement against displacement. Locate and support with metal chairs, runners, bolsters spacers and hangers, as required. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

3.3.3.5 *Fabric Length* - Install welded wire fabric in as long lengths as practicable, lapping at least one mesh at both ends and sides. Tie or interlace at laps.

3.3.3.6 *Joints* - Provide construction, isolation, and control joints as indicated or required. Locate construction joints so as to not impair strength and appearance of structure. Locate isolation and control joints in slabs-on-ground to accommodate differential settlement and prevent random cracking.

3.3.3.7 *Installation of Embedded Items* - Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by cast-in-place concrete. Use setting diagrams, templates, and instructions provided by others for locating and setting.

3.3.3.8 *Concrete Placement* - Comply with ACI, placing concrete in a continuous operation within planned joints or sections. Do not begin placement until work of other trades affecting concrete is completed.

3.3.3.9 *Concrete Consolidation* - Consolidate concrete using mechanical vibrating equipment, hand rodding and tamping, so that concrete is well compacted around reinforcement and other embedded items and into forms.

3.3.3.10 *Concrete Protection* - Protect concrete from physical damage or reduced strength due to weather extremes during mixing, placement and curing.

3.3.3.10.1 In cold weather comply with ACI 306, Specification for Cold Weather Concreting.

3.3.3.10.2 In hot weather comply with ACI 305, Specification for Hot Weather Concreting.

3.3.4 *Concrete Finishes* -

3.3.4.1 *Exposed-to-view Surfaces* - Provide a smooth finish for exposed concrete surfaces and surfaces that are to be covered with a coating or covering material applied directly to concrete. Remove fins and projections, patch defective areas with cement grout, and rub smooth.

3.3.4.2 *Slab Trowel Finish* - Apply trowel finish to monolithic slab surfaces that are exposed-to-view or are to be covered with resilient flooring, paint or other thin film coating. Consolidate concrete surfaces by floating then finish troweling, free of trowel marks, and uniform in texture and appearance.

3.3.4.3 *Broom Finish* - Apply broom finish to monolithic slab surfaces that are exposed to view and subject to vehicular or pedestrian traffic. Consolidate concrete surfaces by floating and troweling prior to applying broom finish.

3.3.4.4 *Curing* - Begin initial curing as soon as free water has disappeared from exposed surfaces. Where possible, keep continuously moist for not less than 72 hours. Continue curing by use of moisture-retaining cover or membrane-forming curing compound. Cure formed surfaces by moist curing until forms are removed. Provide protections as required to prevent damage to exposed concrete surfaces.

3.3.5 *Field Quality Control* -

3.3.5.1 *Concrete Control* - The verification and control of all concrete shall be performed by and independent testing laboratory. Cost of testing shall be paid for by the Contractor. All concrete testing shall be performed by ACI certified technicians in accordance with ASTM 94, Standard Specification for Ready Mix Concrete.

3.3.5.2 *Laboratory Services* - Laboratory services shall be as follows:

3.3.5.2.1 Make, cure, store and break test cylinders conforming to the requirements of ASTM C31, Standard Method of Making and Curing Concrete Test Specimens in the Field, ASTM C39, Standard Method of Test for Compressive Strength of Cylindrical Specimens; ASTM C143, Standard Method for Test of Slump of Portland Cement Concrete; ASTM C172 Test

cylinders shall be taken at job site and under no circumstances shall they be taken at a central mixing plant.

3.3.5.2.2 Report on all tests conducted by laboratory shall be rendered promptly and distributed as follows:

3.3.5.2.2.1 ECUA – two (2) copies

3.3.5.2.2.2 Engineer – one (1) copy

3.3.5.2.2.3 Contractor – as requested

3.3.5.2.3 Reports of control cylinders for job placed concrete shall conform to ASTM C94, Standard Specification for Ready Mix Concrete.

3.3.5.2.4 Contractors Function in Concrete Testing. Refer to the following list of functions:

3.3.5.2.4.1 Contractor shall comply with ACI 301, Specification for Structural Concrete for Buildings. Contractor shall provide assistance as necessary for cylinder sampling.

3.3.5.2.4.2 Contractor shall keep a daily log, recording quantities of each class used, the area of location or each quantity of concrete relating to its controlling cylinder. The Contractor shall furnish this information to the tickets, should ECUA so request.

3.3.5.2.5 Detailed Requirements. Refer to the following list of detailed requirements:

3.3.5.2.5.1 Of the test cylinders taken, one shall be broken at 7 days; two shall be broken at 28 days and one held in reserve.

3.3.5.2.5.2 Acceptance of concrete shall be in accordance with ACI 301, Specification for Structural Concrete for Buildings.

3.3.6 *Patching* - Patch Imperfections

3.3.7 *Defective Concrete* -

3.3.7.1 *Levels and Lines* - Modify or replace concrete not conforming to the required levels and lines, details and elevations.

3.3.7.2 *Type* - Repair or replace concrete not properly placed of the specified type.

3.3.8 *Protection* -

3.3.8.1 *Temperature* - Immediately after placement, protect concrete from premature drying, excessive hot or cold temperatures, and mechanical damage.

3.3.8.2 *Moisture* - Maintain concrete with minimal moisture loss at relative constant temperature for period necessary for hydration of cement and hardening of concrete.

PART 4: Measurement and Payment

4.1 *General* –

4.1.1 Graded Aggregate Base and Asphalt Concrete shall be measured for payment either in square yards or by lump sum only for areas indicated on the plans, or as provided in the proposal and contract.

4.1.2 Compensation, will be for furnishing all materials, labor, equipment, tools and incidentals required for the work, all in accordance with the plans and these specifications.